Progress Energy

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.73

October 29, 2004
3F1004-06

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: LICENSEE EVENT REPORT 50-302/2004-003-00

Dear Sir:

Please find enclosed Licensee Event Report (LER) 50-302/2004-003-00. The LER discusses a reactor trip from 97% Rated Thermal Power and an emergency feedwater system actuation on September 6, 2004. This report is being submitted pursuant to 10CFR50.73(a)(2)(iv)(A).

No new regulatory commitments are made in this letter.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

Jon A. Franke
Plant General Manager
Crystal River Nuclear Plant

JAF/dwh

Enclosure

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W. Powerline Street
Crystal River, FL 34428

IE22

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
CRYSTAL RIVER UNIT 3	05000302	1 OF 8

4. TITLE
Reactor Trip And Emergency Feedwater Actuation Caused By 230 Kilovolt Switchyard/Transmission Faults

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
09	06	2004	2004	- 003 -	00	10	29	2004	FACILITY NAME: N/A	DOCKET NUMBER: 05000

9. OPERATING MODE
1

10. POWER LEVEL
97%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Dennis W. Herrin – Lead Engineer (Licensing & Regulatory Programs)	(352) 563-4633

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	FK	INS	L085	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

At 11:51, on September 6, 2004, Progress Energy Florida, Inc., Crystal River Unit 3, was in MODE 1 (POWER OPERATION) at 97 percent RATED THERMAL POWER. During Tropical Storm Frances, phase-to-ground faults occurred concurrently on a 230 kilovolt transmission line and a 230 kilovolt switchyard south bus breaker. Loss of power to the Startup transformer resulted in opening the reactor trip breakers, tripping of the reactor coolant pumps and main feedwater pumps, and loss of power to the Main Turbine Lube Oil System. A main turbine trip and subsequent actuation of the Reactor Protection System occurred. The Emergency Feedwater Initiation and Control System actuated to feed the Once Through Steam Generators. The transmission line fault was caused by mechanical failure of a carbon steel pin in a vertical string of insulators due to high wind conditions. The breaker fault was caused by flashover due to contamination from wind and salt spray. The insulator string was replaced. The breaker was tested, inspected, washed down and returned to service. Actuation of the Reactor Protection System and Emergency Feedwater System are reportable to the NRC. This report is being submitted pursuant to 10CFR50.73(a)(2)(iv)(A). This condition does not represent a reduction in the public health and safety. No previous similar occurrences have been reported.

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

EVENT DESCRIPTION

At 17:10 on September 5, 2004, Crystal River Unit 3 (CR-3) declared an Unusual Event based on issuance of a Hurricane Warning for Citrus County by the National Weather Service. At 17:35, the NRC Operations Center was notified (Event Number 41022). Tropical storm force wind gusts and heavy rain were anticipated due to the projected path of Hurricane Frances.

On September 6, 2004, Progress Energy Florida, Inc., (PEF) CR-3 was in MODE 1 (POWER OPERATION) at approximately 97 percent RATED THERMAL POWER. The Train "A" Engineered Safeguards (ES) 4160 volt bus [EB, BU] was being supplied power from the Offsite Power Transformer (OPT) [EB, XFMR]. The Train "B" ES 4160 volt bus was being supplied power from the Backup ES Transformer (BEST) [EB, XFMR].

At 11:02 on September 6, 2004, a fault on the 230 kilovolt (kV) Brookridge transmission line [FK, CBL] resulted in the opening of Breakers 1690 and 1691 (see Figure 1) [FK, BKR]. Mechanical failure of an insulator string [FK, INS] resulted in a phase-to-ground fault when the transmission line dropped into the metal transmission tower [FK, TWR]. That transmission tower is located along the transmission corridor approximately two miles from the CR-3 switchyard. This removed one of the sources of power to the BEST and Startup transformer [EB, XFMR].

At 11:51, on September 6, 2004, a fault on the 230 kV switchyard south bus [FK, BU] resulted in the opening of Breaker 1692 (see Figure 1). A phase-to-ground fault on Breaker 3232 resulted in actuation of the primary and backup bus differential relaying schemes [FK, 87] resulting in the tripping of Breakers 3235, 3232, 3231, 1695, 1160, 1157, 4902 and 1692. This removed the remaining source of power to the BEST and Startup transformer. Improved Technical Specification (ITS) 3.8.1, Condition A, was entered for loss of the BEST.

Loss of the BEST resulted in an undervoltage condition on the Train "B" ES 4160 volt bus. Emergency Diesel Generator EGDG-1B [EK, DG] started and loaded onto the Train "B" ES 4160 volt bus.

The OPT remained available throughout this event, providing offsite power to the Train "A" ES 4160 volt bus. Breaker 4902 was open as a result of the 230 kV switchyard south bus trip, but breaker 4900 remained closed and provided power from the 230 kV switchyard north bus.

Loss of the Startup transformer resulted in a loss of power to the CR-3 6900 volt, 4160 volt [EB BU] and 480 volt [ED, BU] unit busses.

Loss of the Startup transformer resulted in: opening of the reactor trip breakers [AA, BKR] and insertion of the control rods [AA, ROD] into the reactor core; tripping the four reactor coolant pumps (RCP-1A, -1B, -1C and -1D) [AB, P]; and, loss of power to the Main Turbine Lube Oil System [TD]. Subsequent tripping of the Main Turbine [TA, TRB] resulted in actuation of the Reactor Protection System (RPS) [JC].

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Power was lost to both main feedwater pumps (FWP-2A and -2B) [SJ, P]. The Emergency Feedwater Initiation and Control system (EFIC) [JB] actuated upon loss of the RCPs and main FWPs. Diesel driven Emergency Feedwater Pump EFP-3 [BA, P] and steam driven EFP-2 started, providing flow to the Once Through Steam Generators (OTSGs) [AB, SG].

The Main Steam Isolation Valves [SB, ISV] were closed per procedure and the plant was stabilized in natural circulation using EFP-3 and the Atmospheric Dump Valves [SB, V].

Besides the 230 kV Brookridge transmission line fault, no structures, systems or components were inoperable at the start of the event that contributed to the event. No pertinent maintenance or surveillance activities were in progress. Plant systems operated normally during the reactor trip, with exception of the following:

The FWP-2B turbine emergency lubricating oil pump (FWP-5B) motor [LL, P] was noted as running with no indicated discharge pressure. FWP-2B experienced a four minute coastdown without lubricating oil. An investigation revealed incorrect termination of the motor power leads that resulted in FWP-5B rotating in the wrong direction. No damage to the FWP-2B turbine bearings was experienced.

The Annunciator Alarm System [IB] was overloaded due to multiple post trip alarms. The Annunciator Alarm System was reset. Approximately twenty minutes of alarm data was lost.

Actuation of the RPS and Emergency Feedwater (EFW) System [BA] are reportable to the NRC. At 12:44, on September 6, 2004, a non-emergency four-hour notification and a non-emergency eight-hour notification was made to the NRC Operations Center (Event Number 41023) in accordance with 10CFR50.72(b)(2)(iv)(B) and 10CFR50.72(b)(3)(iv)(A), respectively. This report is being submitted pursuant to 10CFR50.73(a)(2)(iv)(A).

SAFETY CONSEQUENCES

Upon loss of the BEST, an undervoltage condition on the Train "B" ES 4160 volt bus resulted in the start and loading of Emergency Diesel Generator EGDG-1B. Loss of the Startup transformer resulted in opening the reactor trip breakers and insertion of the control rods into the reactor core; tripping the four reactor coolant pumps; and loss of power to the Main Turbine Lube Oil System. Subsequent tripping of the Main Turbine resulted in actuation of the RPS. Loss of the RCPs and both main FWPs resulted in an automatic EFIC actuation. Valid actuation of the RPS and EFIC System occurred to shut down the reactor and maintain adequate OTSG levels. The diesel driven EFP-3 and steam driven EFP-2 started to provide flow to the OTSGs.

The Main Steam Isolation Valves were closed per procedure and the plant was stabilized in natural circulation using EFP-3 and the Atmospheric Dump Valves. Reactor operators properly executed the Emergency Operating Procedures for plant shutdown.

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At 07:19 on September 7, 2004, off site power was returned to the BEST and the actions of ITS 3.8.1, Condition A, were exited.

Based on the above discussion, PEF concludes that the RPS and EFW System performed as designed and did not represent a reduction in the public health and safety. The OPT remained available throughout this event, providing power to the Train "A" Engineered Safeguards (ES) 4160 volt bus. Therefore, this event does not meet the Nuclear Energy Institute definition of a Safety System Functional Failure (NEI 99-02, Revision 2).

CAUSE

The cause for loss of the 230 kV Brookridge transmission line was mechanical failure of a vertical string of insulators on the "A" phase due to diameter loss and consequent failure of one of the carbon steel pins connecting the insulators to one another. The porcelain "ball and socket" insulators were stamped "LAPP 20000 1968," indicating that they were manufactured by the Lapp Insulator Company and were 1968 vintage. The diameter loss was caused by possible leakage current which led to spark erosion and severe electrochemical corrosion of the carbon steel pin. Corrosion/erosion reduced the cross section of the carbon steel pin sufficiently to result in tensile overload. The passing of Tropical Storm Frances resulted in tropical storm force winds that placed additional stress on the carbon steel pin. A phase-to-ground fault occurred when the "A" phase transmission line dropped and came in contact with the metal transmission tower.

The tripping of the 230 kV switchyard south bus was due to a flashover ("B" phase-to-ground) on breaker 3232 due to contamination from wind and salt spray from the passing of Tropical Storm Frances. The bus differential relaying schemes functioned as designed based on the fault condition of the breaker and isolated the fault by opening breakers 3235, 3232, 3231, 1695, 1160, 1157, 4902 and 1692. Since the relaying functioned as designed to protect the adjacent equipment from the fault and the fault occurred as a result of Tropical Storm Frances, there were no inappropriate acts or equipment failures. Therefore, there is no corrective action to prevent recurrence of this condition.

CORRECTIVE ACTIONS

1. CR-3 Administrative Instruction AI-704, "Reactor Trip Review and Analysis," was performed.

2. The failed vertical string of insulators was replaced. Vertical and "V" string insulators on the 230 kV Brookridge transmission line towers located along the transmission corridor adjacent to the CR-3 access road were inspected. Thirteen additional vertical strings of insulators were subsequently replaced on the 230 kV Brookridge transmission line.

3. A 230 kV switchyard south bus reenergization plan was created and implemented. The primary purpose of this plan was to reveal internal breaker faults prior to bus restoration. No internal breaker faults were identified. The 230 kV switchyard south bus breakers were closed and the 230 kV switchyard south bus was restored on September 7, 2004.

4. Breaker 3232 was evaluated. Physical evidence was found to confirm that a flashover had occurred from the "B" phase to ground. A series of tests were performed on the breaker with results being acceptable. In addition, an internal inspection was performed on the "B" phase of the breaker with results being acceptable. A complete hot wash was performed on insulators and breakers on the 230 kV switchyard south bus prior to CR-3 restart. A visual inspection of other sections of the 230 kV switchyard buses was also performed. The determination was made that additional hot washing was not required.

5. Other actions associated with this event are being addressed in the CR-3 Corrective Action Program in Nuclear Condition Report 136752.

PREVIOUS SIMILAR EVENTS

No previous similar events involving loss of offsite power to the Startup transformer due to the loss of the 230 kV Brookridge transmission line and the 230 kV switchyard south bus have been reported to the NRC by CR-3.

ATTACHMENTS

Figure 1 - 230 kV Switchyard Simplified Drawing

Attachment 1 - Abbreviations, Definitions, and Acronyms

Attachment 2 - List of Commitments

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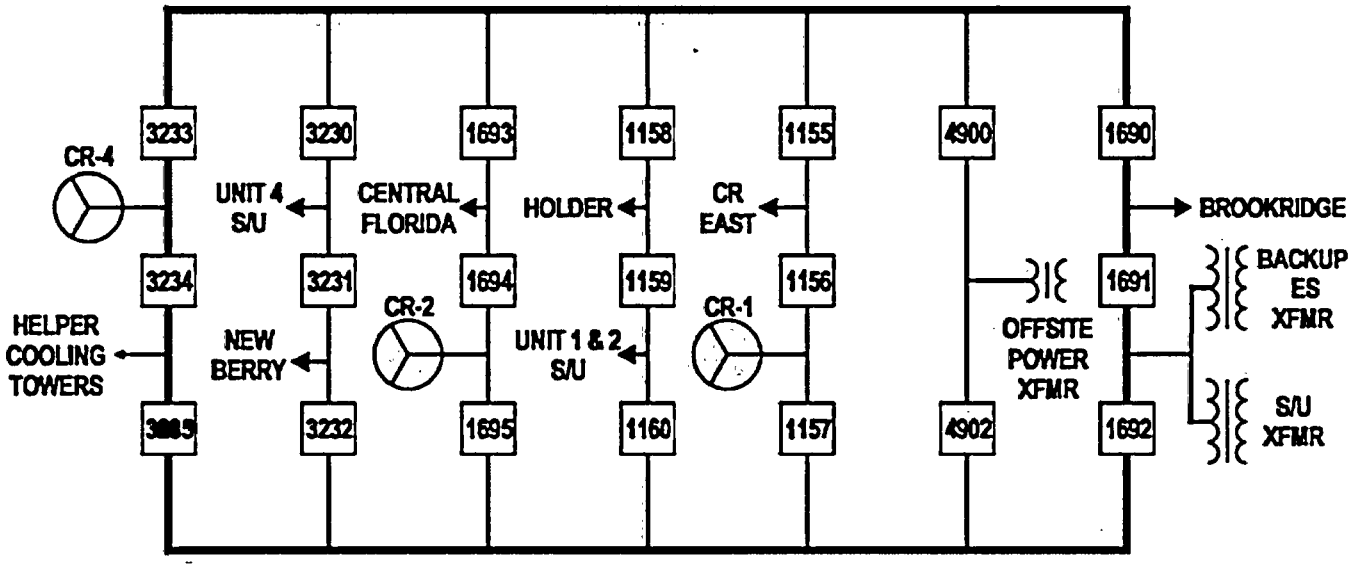
FIGURE 1

230 KV SWITCHYARD SIMPLIFIED DRAWING



ATTACHMENT 1

ABBREVIATIONS, DEFINITIONS AND ACRONYMS

AI	Administrative Instruction
BEST	Backup Engineered Safeguards Transformer
CFR	Code of Federal Regulations
CR-3	Crystal River Unit 3
EFIC	Emergency Feedwater Initiation and Control
EFW	Emergency Feedwater
EGDG	Emergency Diesel Generator
ES	Engineered Safeguards
FWP	Feedwater Pump
ITS	Improved Technical Specifications
kV	kilovolt
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
OPT	Offsite Power Transformer
OTSG	Once Through Steam Generator
PEF	Progress Energy Florida, Inc.
RCP	Reactor Coolant Pump
RPS	Reactor Protection System

NOTES: Improved Technical Specifications defined terms appear capitalized in LER text {e.g., MODE 1}

Defined terms/acronyms/abbreviations appear in parenthesis when first used {e.g., Reactor Building (RB)}.

EIIS codes appear in square brackets {e.g., reactor building penetration [NH, PEN]}.

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ATTACHMENT 2

LIST OF COMMITMENTS

The following table identifies those actions committed to by PEF in this document. Any other actions discussed in the submittal represent intended or planned actions by PEF. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Supervisor, Licensing & Regulatory Programs of any questions regarding this document or any associated regulatory commitments.

RESPONSE SECTION	COMMITMENT	DUE DATE
	No regulatory commitments are being made in this submittal.	